Developing Targeted Training Materials to Reduce Beryllium Health Effects:"  Informed

Preventing Beryllium Sensitization and Chronic Beryllium Disease Through Exposure Recognition and Control"

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Susan Harwood Training Grant

- OSHA funded, one year
- Named in honor of Susan Harwood, former director of the Office of Risk Assessment in OSHA's Health Standards Directorate
  - Helped develop OSHA standards to protect workers exposed to bloodborne pathogens, cotton dust, benzene, formaldehyde, asbestos and lead in construction.
- Targeted Topic Grant
  - Focus on training of workers and/or multiple employers on targeted occupational safety and health hazards
- Training audience specific
  - Workers, employers, young workers, non-English speaking and limited English proficiency workers
- Available Free of Charge on OSHA website
  - Includes training manuals, trainer scripts Power Point presentations, handouts
  - Some products available in Spanish, Vietnamese, and Mandarin.

Training Materials Development

- Training Development
  - Needs assessment
  - Pilot Testing
- Worker Training
  - Contents
  - Presentation Design
  - Participatory Activities
  - Pre-test / Post-test

- Training Evaluation
  - Level 1: Training reaction assessment
  - Level 2: Pre and post knowledge tests
  - Level 3: 90-day knowledge retention and training impact

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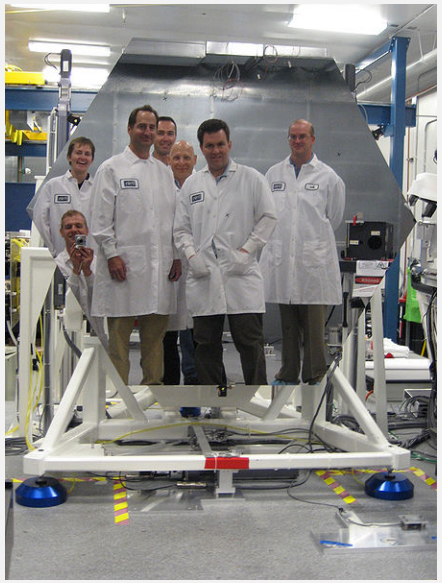
Training Materials Development

Needs Assessment:

- Identify worker training needs based on gaps in knowledge and performance, and the reasons for them.
- Understand how and where beryllium is used in specific workplace.



- Training development partners were selected from three different beryllium-using industries:
  - Precision machining
  - Aerospace
  - Aluminum smelting
- Steps in needs assessment process:
  - Completion of comprehensive questionnaires
  - Follow-up telephone interviews

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Questionnaire: Conference Call

- **Parts One, Facility Background Information Questionnaire**
  - Assess site specific uses of beryllium
- **Part Two, Management and Supervisor Reported Performance Questionnaire**
  - Identify beryllium related performance problems amenable to employee training.
  - Completed individually by the following individuals :
    - Organizational health and safety
    - Human resources issues related to beryllium activities at the facility.
    - A shop-floor supervisor or line manager responsible for beryllium related activities at the facility.
- **Part Three, Employee Reported Performance Questionnaire**
  - Assess root causes of performance problems that can be addressed in the training.
  - Completed by employee in each department with potential beryllium exposure.

Forms returned and reviewed prior to conference call

- **Part Four, Conference Call:**
  - Clarify performance problems and identify whether or not these could be addressed through training.
  - Call should be attended by the three individuals identified in Part Two.

Training Materials Development

- The **needs assessment** identified gaps in knowledge and/or performance in the following areas:
  - Preventing take-home exposure
  - Covering skin, especially open wounds
  - Importance of low-level exposure
  - Health hazards and methods to detect health effects
  - Exposure control
  - Workers' right of access to records

- **<u>Pilot Testing</u>**
  - Training materials refined based on input from pilot testing at each training development partner.

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Worker Training

Contents of the Worker Training

- Introduction to OSHA
- Overview of Beryllium
- Health Effects
- Exposure Recognition
  - Tailored to different beryllium-using industries
- Exposure Control
- Medical Surveillance

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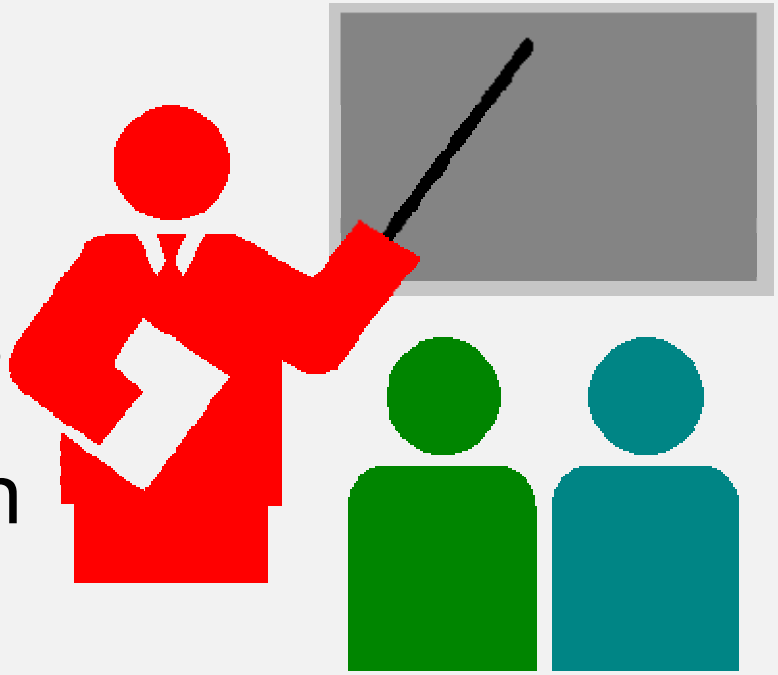
Worker Training

Presentation Design

- High-impact visuals
- Better suited for non-technical workers
- Facilitated explanation of difficult concepts



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Worker Training: Presentation Slides

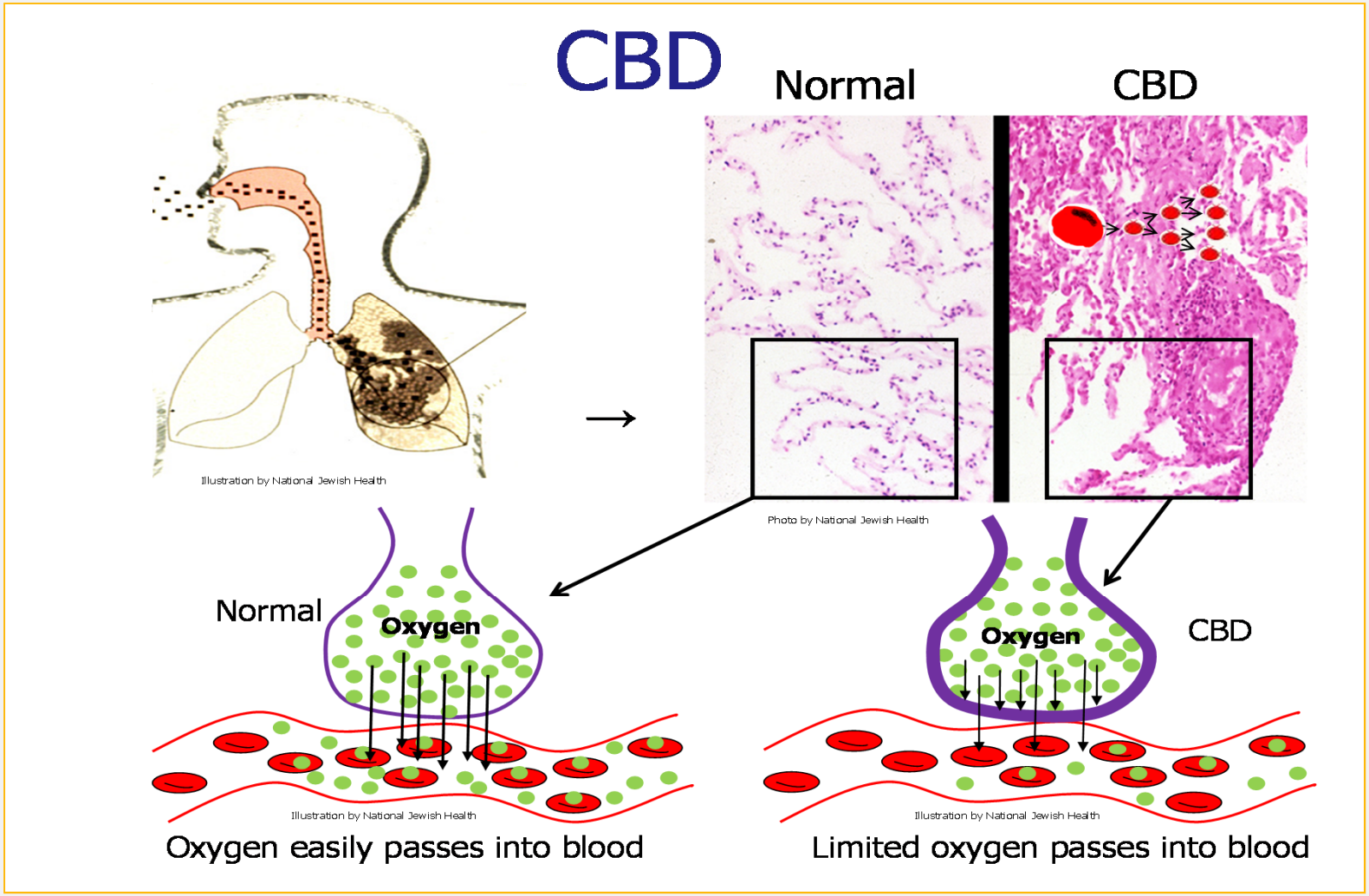

Figure 1: Diagram to facilitate explanation of CBD, a complex medical subject.

Worker Training: Presentation Slides

Is "take-home" exposure important?

Beryllium in wipe samples from workers' personal vehicles

Steering Wheel:

Up to 5.3 µg/100 cm^2

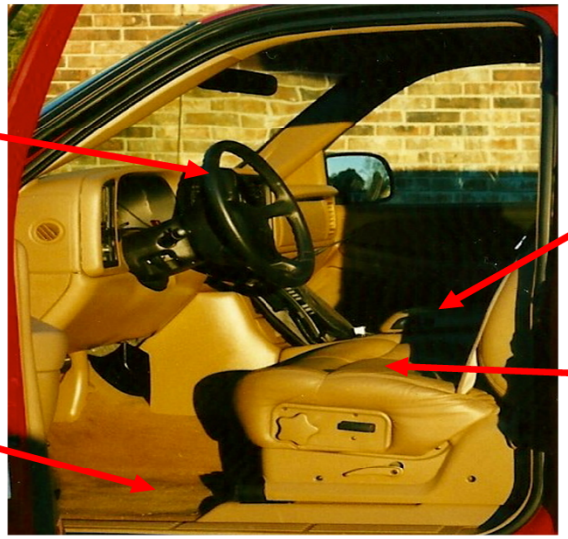

Photo by National Jewish Health

Driver's armrest:

Up to 39.7 µg/100 cm^2

Driver's seat:

Up to 15.9 µg/100 cm^2

Driver's floor:

Up to 76.8 µg/100 cm^2

- Airborne beryllium has been measured while washing work clothes at home
- Cases of BeS and CBD have been seen in family members of beryllium workers

Changing clothes, changing shoes and showering is important to prevent take-home exposure.

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Figure 2: Labeled photo to demonstrate possible sources of exposure.

Worker Training: Activities

Participatory Activities

- Proven training technique for adult learners
- Engaged workers in active learning
- Reinforced primary learning objectives

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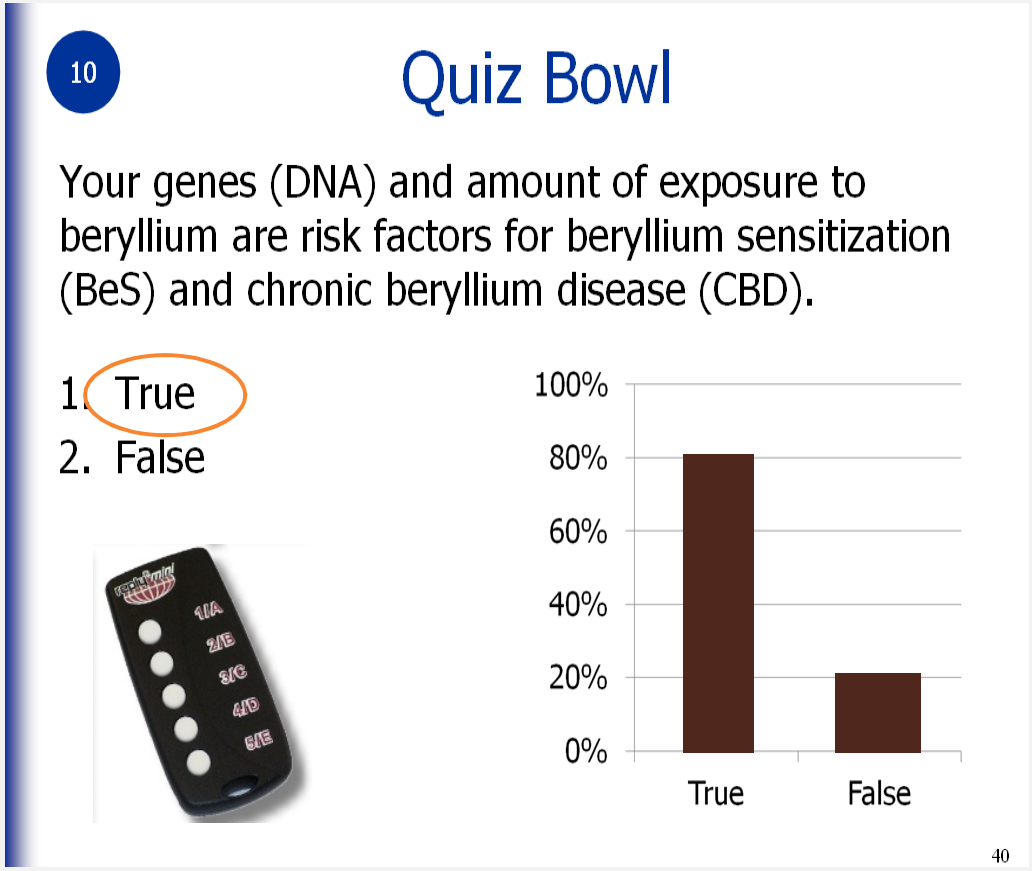
Worker Training: Quiz Bowl



The Quiz Bowl allowed for real time identification of any remaining knowledge deficits and the opportunity to review and reinforce the primary learning objectives.

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Worker Training: Activity

The Glo Germ™ activity demonstrated the ease of spread of fine particles and dust.

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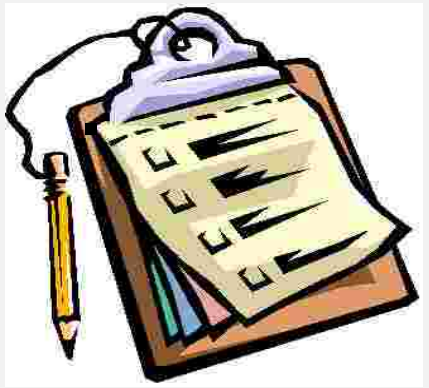
Training Evaluation



- Level 1: Training reaction assessment
- Level 2: Knowledge assessments
  Pre- and post- tests
- Level 3: 90-day knowledge retention
  and training impact assessments

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Evaluation Results by Training Site

Site	n	Pre-Test	Post-Test	90-Day
A	9	77%	99%	91%
B	27	92%	98%	98%
D	45	74%	90%	98%
E	279	78%	92%	87%
F	61	87%	99%	Not evaluated
Total	**421**	**82%**	**96%**	**94%**
Pre-Test vs. Post-Test				**p = 0.0004**
Post-Test vs. 90-Day				**p = 0.7444**

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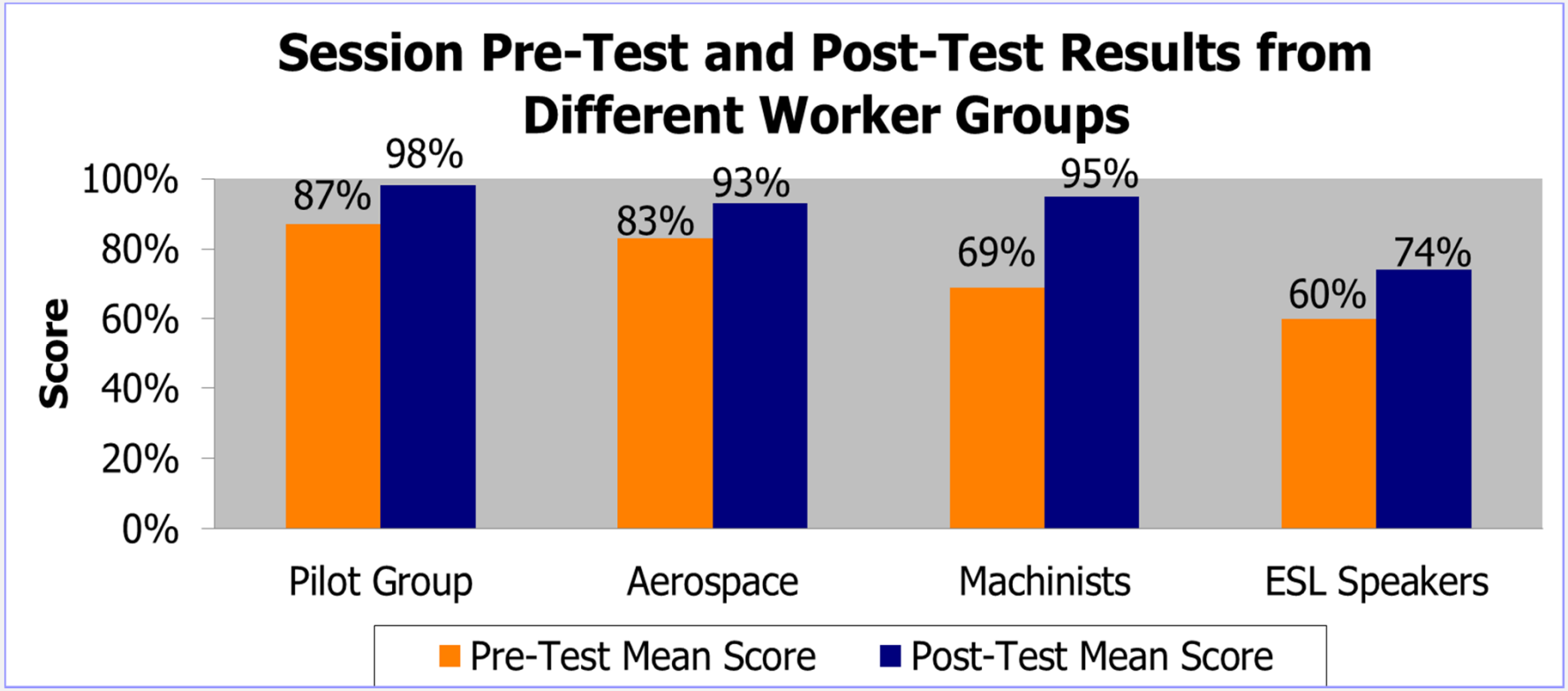
Training Evaluation



- All worker groups had higher post-test scores.
- Post-test scores improved, but were lower in the ESL workers than the other worker groups.

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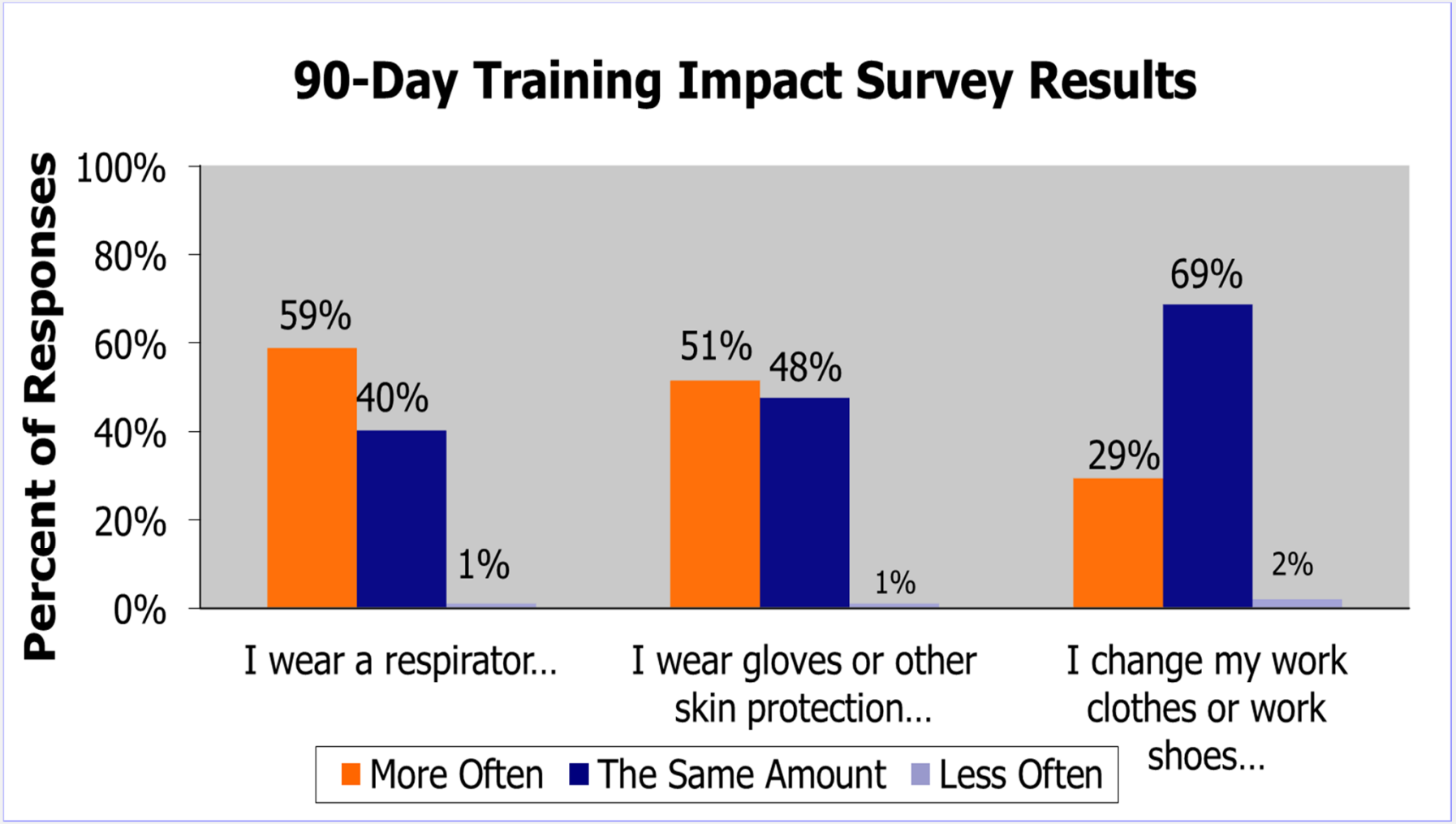
Training Evaluation



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Difficult Concepts

- Concepts communicated by multiple modes
  - Text, visuals, trainer role play, Quiz Bowl.
- Post-test indicated lack of comprehension
  - Area samples are as good as personal samples to determine a beryllium worker's exposure to beryllium particles in the air.

    TRUE or FALSE
  - A beryllium lymphocyte proliferation test detects chronic beryllium disease

    TRUE or FALSE

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Summary

Demonstrated Benefits of Training

- Improved knowledge about beryllium health effects and exposure control by an average of 14%.
- Knowledge gains maintained on 90-day follow-up test.
- Improved work practices to reduce beryllium exposures including more frequent:
  - use of respirator: 59%
  - use of gloves: 51%
  - changing of clothes/shoes: 29%.

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Summary

Lessons Learned For Future Training

1. The needs assessment is time-consuming, but provides important information on how to best tailor the material to how beryllium is used in the workplace and to meet the workplace training needs.
2. Participatory activities engage adult learners and reinforce key information.
3. Health and safety training in primary language could benefit ESL workers fluent in “workplace” English.
4. Repeat critical information using multiple modalities – **graphics**, **WORDS**, and ***ACTIVITIES*** to better reach all learner types and education levels.

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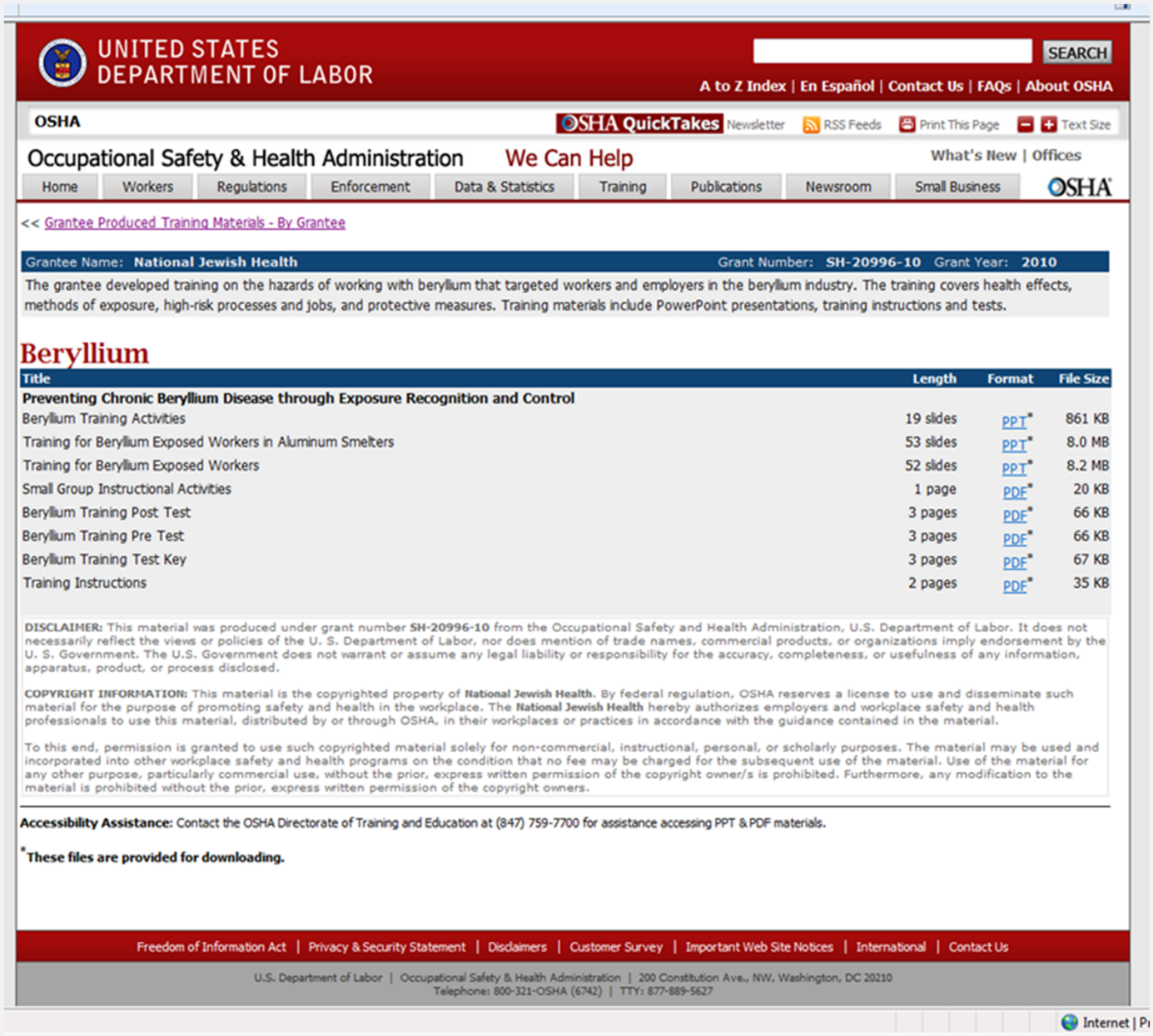

All training materials with trainer script are available online at http://www.osha.gov/dte/grant_materials/fy10/sh-20996-10.html

4 Be Beryllium Informed

TRUE or FALSE

You can use a specially trained "beryllium badger" to detect beryllium exposure in your workplace.

Questions ?

Thank You

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